

thence northeastward and eastward by way of the upper Lakes to Cape Breton Island, occupying eight days in its passage.

No particular interest attaches to the remaining lows except Nos. VII and X. No. X developed an extremely rare north to west movement from central Kansas to the Saskatchewan Valley, and No. VII also exhibited a westward tendency after reaching southern Mississippi.—*H. C. Frankenfield, Forecast Official.*

RIVERS AND FLOODS.

River affairs along the great systems, the Missouri, Mississippi, and Ohio, were quiet and uneventful during the month. There was more water in the Mississippi and Upper Missouri, and considerably less in the Lower Missouri and Ohio than during March, 1900. Good navigable stages were available throughout the month. In the Mississippi between Helena, Ark., and Vicksburg, Miss., there was an average stage of about 30 feet. When compared with those of April, 1899, the stages show a considerable decrease.

The Lower Tennessee was in flood from the 18th to the 28th, inclusive, on account of heavy rains over its middle watershed, reaching a stage of 19.2 feet at Florence, Ala., 3.2 feet above the danger line, and a stage of 29.1 feet at Johnsonville, Tenn., 8.1 feet above the danger line. Warnings were issued when necessary, and no damage of consequence was reported except the loss of a number of cross-ties at Florence, Ala.

In the rivers of the South Atlantic and the Gulf States matters were more interesting, and the conditions varied from moderate floods in the Carolinas to enormous ones in Mississippi and western Alabama. The Cape Fear River at Fayetteville, N. C., reached 44 feet on the 21st and 22d, 6 feet above the danger line, and the rivers of South Carolina were generally above the flood limits at various times during the third decade of the month. The rivers of northern Georgia were also moderately high, and those of eastern Alabama decidedly so, the Alabama River rising to 36.5 feet at Montgomery, Ala., 1.5 feet above the danger line, and to 41 feet at Selma, Ala., 6 feet above the danger line. Ample warnings of these rises were uniformly given, and no reports of serious loss or damage have been received.

Very severe and disastrous floods occurred in western Alabama and southern Mississippi. The Tombigbee and Black Warrior rivers in Alabama reached the highest stages on record, and the total damage amounted to about \$1,500,000. The following report of this flood was prepared by Mr. W. M. Dudley, official in charge of the Weather Bureau office at Mobile, Ala.:

The rivers in this district, the Tombigbee and Warrior, were at good navigable stages from the first of April, 1900, marked falls being checked by frequent rains, especially on the 10th and 11th, when general and heavy rainfalls, ranging from one to over three inches, occurred over the watershed, causing marked rises in the Upper Tombigbee and Warrior rivers, exceeding the danger-line stage at Tuscaloosa, Ala., on the morning of the 12th, the rise being 26.5 feet to a stage of 52.8 feet. This rise continued until the morning of the 16th, when a slight fall began at stations on the Upper Tombigbee and Warrior rivers, with a continued rise on the Lower Tombigbee from Demopolis, Ala., south.

With the stages already abnormally high, excessive and remarkable rainfalls occurred over the watershed on the 16th and 17th. The following are some of the amounts recorded: Columbus, Miss., 4.50 inches; Demopolis, Ala., 9 inches; Tuscaloosa, Ala., 7.15 inches; Livingston, Ala., 10 inches; Macon, Miss., 5.20 inches; Waynesboro, Miss., 3 inches; Warrior, Ala., 3.86 inches.

In anticipation of an unusual flood, warnings were telegraphed on the morning of the 17th to the river observers at Columbus, Miss., and Demopolis and Tuscaloosa, Ala., predicting a 40-foot stage at Columbus, Miss., and a 70-foot stage at Demopolis and Tuscaloosa, Ala., on this rise, that at Demopolis to occur by the close of the week. These warnings were redistributed from these points by mail to places along the rivers, and were instrumental in saving both life and property, particularly live stock, but little of which was lost. Attention is invited

to the following extract from a letter of our river observer, Mr. George E. Pegram, Demopolis, Ala.:

"I sent warnings to the following places: Pleasant Ridge, Tishabee, and Forkland, in Green County; Belmont, McDowells, and Whitfield, in Sumpter County, and Jefferson and Myrtlewood in Marengo County, all postoffices, and near the river. The warning was heeded by all but two persons, and all the stock was saved, except by those two, one of whom lost \$2,000, and the other about \$300 worth of stock."

The steamer *Hattie B. Moore*, which left Mobile, Ala., on the evening of the 17th, for Demopolis, Ala., distributed the warnings to all points along the river, so that the people were duly informed of the impending flood, as the steamer left this end and reached Demopolis before the effect of the flood was felt in the lower river. In this connection is given herewith a letter from Capt. E. B. Kirkbride, General Manager of the Warrior and Bigbee River Packet Company:

"MOBILE, ALA., May 12, 1900.

"Mr. W. M. DUDLEY,

"Weather Bureau, Mobile, Ala.

"DEAR SIR: On Tuesday morning, April 17, 1900, you reported to this office a rainfall of 4.50 inches at Columbus, 9 inches at Demopolis, and 7.15 inches at Tuscaloosa. At same time you predicted a dangerously high stage of water, resulting from a combination of the good stage of water then in river and the excessive rainfall. Acting upon this prediction, the worth of which had been practically demonstrated on several previous occasions, I requested Captain Stone of steamer *Hattie B. Moore*, leaving that evening for points along the Bigbee and Warrior rivers, to notify the planters that the largest flood of many years was coming down the river and to prepare for it.

"Owing to the quick transmittal of this information many cattle were saved and possibly the loss of human life prevented, whereas in former years such a flood would have caused the loss of several lives and thousands of heads of cattle. Permit me to congratulate you upon the part you have played in this humanitarian effort of the Government.

"I remain, with much respect, yours, truly,

"(Signed) E. B. KIRKBRIDE,

"Manager."

As a result of these excessive rainfalls the rivers rose rapidly, attaining a maximum stage of 27.6 feet at Columbus, Miss., on the 19th, but no damage was done, save in the delay of crops, where lowlands were submerged.

At Tuscaloosa, Ala., on the Black Warrior, the river rose suddenly from a stage of 37.1 feet on the morning of the 16th, to 63.0 feet on the morning of the 17th, reaching a maximum stage of 65.0 feet on morning of 18th, which is 2.4 feet above the previous highest flood on record (April, 1892). The statement of Mr. W. S. Wyman, river observer at this point, is appended:

"TUSCALOOSA, ALA., May 11, 1900.

"Mr. W. M. DUDLEY,

"Official in charge, Mobile, Ala.

"SIR: I have the honor to submit the following report of the flood of April 16, 1900, in this district:

"On April 16 there occurred the highest and most violent flood on the Black Warrior River ever known in this region. The rainfall was unprecedented, being 8.40 inches at Tuscaloosa, Ala., in a continuous rain lasting about thirty-two hours.

"When this rainfall occurred the river at Tuscaloosa was falling from a recent rise and was over 37 feet on the gage. It began rising again on the afternoon of the 16th and rose very rapidly during the night. It rose less rapidly next morning and culminated at 3 p. m. at 65.16 feet, being 2.40 feet above the previous highest flood on record (April, 1892). Residents below Tuscaloosa report this flood to have been 1½ to 3 feet higher than any previous one within memory. The river began to fall about 4 p. m. April 17, and fell about 1 foot during the night.

"The flooded area is estimated to have been about 8 or 10 square miles, and the damage done consisted mainly in the loss of two iron bridges, many wooden bridges, fences, small houses, lumber, small boats, fertilizer, etc. The damage to crops will probably reach \$75,000.

"Flood warnings were mailed at 4 p. m. on April 16 to nine points in Alabama, and it is thought that about \$10,000 worth of stock, etc., were saved by them.

"Very respectfully,

"(Signed.) W. S. WYMAN,

"River Observer."

This great volume of water had yet to come down to Demopolis, Ala., at the junction of the Upper Tombigbee and Black Warrior rivers. The rise was not so sudden, but continued steadily to the 22d, when the maximum stage of 68.7 feet was attained, exceeding the previous highest stage (66.0 feet in April, 1874,) by 2.7 feet.

The following is quoted from the report of the river observer at that point:

"The area of land covered by the flood in my district on the Tombigbee and Black Warrior rivers was about seven miles wide, and much damage was done, as most of the overflowed land had been planted,

Estimated loss to the planters between \$250,000 and \$300,000; I mean by this, loss of stock, negro cabins, corn cribs, and growing corn, which had to be replanted. Land was badly washed and fertilizer destroyed. Nearly every negro cabin was washed away, and two planters lost about 700 bushels of corn each. All the planters having creeks on their places emptying into the rivers were as badly damaged as the river planters, as the creeks overflowed their banks and covered the bottom lands, all of which had been planted. This flood will throw the river planters behind about one month."

The flood wave, being fed by overflowed creeks and small streams, moved slowly southward, carrying with it any obstructions which happened to be in the path, most bridges being carried away by the pressure of the timber coming down in the torrent, and lowlands became inundated, menacing the lives and property of residents, and the timber interests situated thereon. Most of the damage reported was destruction of planted crops, of which vast quantities were destroyed, or badly injured by water. No reports of serious loss to the timber and sawmill interests have been received. The representatives of these interests kept in daily communication with this office, and any probable loss was averted by the warnings.

In many instances the railroad track and ties were washed away, the breaks on the Mobile and Ohio Railroad were many, interrupting transportation, and no trains were run over this road between Meridian, Miss., and Mobile, Ala., for about a week or ten days. Telegraphic communication was interrupted, owing to washing away of bridges, etc. Repairs to railroad and telegraph property are still in progress. Several spans (wooden) of the Louisville and Nashville Railroad Bridge at Pascagoula, Miss., were washed away, as a result of a timber gorge.

It is estimated the damage done by the flood in this district will probably reach one million and a half dollars, and that the amount of property saved from destruction by the warnings of the Bureau, will aggregate a quarter of a million dollars.

The rivers were falling rapidly at the close of the month, and were below the danger line, save at Demopolis and points below on the Lower Tombigbee River.

In southern Mississippi, where the land is quite level, the

enormous rains of the second decade of the month, caused general disaster to everything that could possibly be affected. In many places the rainfall was vastly greater than had ever before been known, and all streams were higher by several feet than the greatest previous record. The Pearl and Black rivers were especially high. Several lives were lost; many entire towns were flooded; railroad traffic of every description was totally suspended for many days; hundreds of bridges, both railroad and highway, were carried away; thousands of heads of stock were drowned; hundreds of barns and houses destroyed, and tens of thousands of acres of lands overflowed, totally destroying the growing crops. It is impossible to give an accurate estimate of the amount of damage done by this flood. It was at least seven or eight millions of dollars, about equally divided between private citizens and the railroad companies.

A detailed report of the great Colorado River flood in Texas during this month has been made by Dr. I. M. Cline, official in charge of the Weather Bureau office at Galveston, Tex., and is printed in another portion of this REVIEW.

The highest and lowest water, mean stage, and monthly range at 131 river stations are given in Table XI. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Rainfall is expressed in inches.

Alabama.—The mean temperature was 62.0°, or about 0.5° above normal; the highest was 91°, at Bermuda on the 24th, and the lowest, 24°, at Oneonta on the 1st. The average precipitation was 9.06, or about 5.00 above normal; the greatest monthly amount, 19.64, occurred at Eutaw, and the least, 3.27, at Rock Mills.

The precipitation was decidedly excessive from west-central to northeastern portions of the State, causing destructive floods in western counties, inundating large areas of planted lands, which had to be entirely replanted.—*F. P. Chaffee.*

Arizona.—The mean temperature was 57.7°, or 5.0° below normal; the highest was 102°, at Fort Mohave on the 18th, and the lowest, 10°, at Flagstaff on the 24th. The average precipitation was 1.37, or 0.54 above normal; the greatest monthly amount, 4.21, occurred at Flagstaff, while none fell at Cochise and Russellville.—*W. G. Burns.*

Arkansas.—The mean temperature was 62.2°, or 0.6° below normal; the highest was 96°, at Conway on the 23d, and the lowest, 24°, at Witts Spring on the 3d, and at Pond on the 12th. The average precipitation was 4.98, or 0.18 above normal; the greatest monthly amount, 10.06, occurred at Rison, and the least, 1.51, at Forrest City.—*E. B. Richards.*

California.—The mean temperature of the State, obtained by weighting the reports from 189 stations, so that equal areas have about equal weight, was 53.9°, which was 2.8° below the April normal for the State, as determined from 157 records; the highest was 102°, at Ogilby, San Diego County, on the 1st, and the lowest, 4°, at Bodie, Mono County, on the 10th. The average precipitation for the State, as determined by the records of 190 stations, was 2.14; the excess, as indicated by reports from 157 stations which have normals, was 0.25; the greatest monthly amount, 8.59, occurred at Delta, Shasta County, while none fell at Ogilby and Palm Springs.—*Alexander G. McAdie.*

Colorado.—The mean temperature was 42.3°, or 2.3° below normal; the highest was 84°, at Lamar on the 2d, and the lowest, 9° below zero, at Longs Peak. The average precipitation was 5.97, or more than double any previous record for April; the greatest monthly amount,

16.52, occurred at Lake Moraine, and the least, 0.79, at Rangely.—*F. H. Brandenburg.*

Florida.—The mean temperature was 70.0°, or normal; the highest was 93°, at Archer on the 17th, Clermont on the 12th, 13th, 23d, and 28th, Earnestville on the 11th and 17th, Eustis on the 11th, and Nocatee on the 12th; the lowest was 33°, at Deland on the 6th. The average precipitation was 4.49, or 2.10 above normal; the greatest monthly amount, 13.05, occurred at Middleburg, and the least, 0.75, at Sebastian.—*A. J. Mitchell.*

Georgia.—The mean temperature was 64.3°, or about normal; the highest was 92°, at Statesboro on the 28th, and the lowest, 23°, at Clayton and Dahlonga on the 1st. The average precipitation was 5.72, or 2.36 above normal; the greatest monthly amount, 10.50, occurred at Toccoa, and the least, 2.77, at Dublin.—*J. B. Marbury.*

Idaho.—The mean temperature was 47.5°, or 2.0° above normal; the highest was 89°, at Hagerman on the 1st, and the lowest, 20°, at Atlanta on the 3d. The average precipitation was 2.05, or 0.63 above normal; the greatest monthly amount, 4.27, occurred at American Falls, and the least, 0.53, at Challis.—*S. M. Blandford.*

Illinois.—The mean temperature was 53.5°, or nearly normal; the highest was 88°, at several stations on different dates, and the lowest, 19°, at Scales Mound on the 10th. The average precipitation was 1.53, or 1.56 below normal; the greatest monthly amount, 3.95, occurred at at Round Grove, and the least, 0.38, at Monticello.—*M. E. Blystone.*

Indiana.—The mean temperature was 52.4°, or nearly normal; the highest was 88°, at Greensburg on the 7th, at Prairie Creek on the 29th and at Fairmont on the 30th, and the lowest, 20°, at Bluffton on the 10th. The average precipitation was 1.64, or 1.62 below normal; the greatest monthly amount, 2.92, occurred at Bluffton, and the least, 0.13, at Bedford.—*C. F. R. Wappenhans.*

Iowa.—The mean temperature was 52.2°, or 2.7° above normal; the highest was 89°, at Hampton on the 27th, and at Redoak on the 28th, and lowest, 19°, at Mt. Pleasant on the 1st. The average precipitation was 2.67, or slightly below normal; the greatest monthly amount, 6.62, occurred at Thurman, and the least, 0.43, at Batavia.—*J. R. Sage, Director; G. M. Chappel, Assistant.*

Kansas.—The mean temperature was 55.8°, or nearly normal; the highest was 88°, at Medicine Lodge on the 26th, and at Oswego on the 9th and 27th, and the lowest, 10°, at Scott on the 10th. The average precipitation was 4.12, or 1.68 above normal; the greatest monthly amount, 6.90, occurred at Olathe, and the least, 2.10, at Sedan.—*T. B. Jennings.*